R E M A R K S

Reconsideration of the application in view of the above amendments and following remarks is respectfully requested. Claims 1, 2, 7, 8, 9, 10, 11 and 12 have been amended. Therefore, claims 1-12 are pending in the application.

Claim Rejections under 35 U.S.C. § 103(a)

The Examiner rejected claims 1-3, 5, 7-9 and 11, as well as claims 10 and 12, under 35 U.S.C. § 103(a) as being unpatentable over Brogan et al., "Group Behavior for Systems with Significant Dynamics". Applicants respectfully traverse these rejections.

Applicants have amended independent claim 1 in order to clarify the distinctions between Applicants' invention and Brogan et al. Namely, Applicants have amended claim 1 to recite "wherein said discrete processing step includes a role replacement step for selecting one or more of the members and for replacing the roles currently assigned to the respective selected members while not replacing the roles currently assigned to the respective non-selected members". Independent claims 7, 8, 9 and 11 have been similarly amended. Dependent claim 2 has been amended to be consistent with amended claim 1.

These amendments are supported by Applicants' original claims 2, 5, 10 and 12, as well as Applicants' specification, which for example states:

> "Because the complexity of the role assignment increases as the factorial of the number of members, the above algorithm cannot be scaled up unless the role replacement is limited to a small subgroup.
>
> In essence, K members having the lowest performance (worst performers) and thus having a large influence upon the overall performance index J are tracked so that when an opportunity for role

> replacement is found, role replacement is performed among those worst performers, thereby reducing the calculation load from N! to K! (K < N or K << N). When the calculation is performed in real time, K generally has a small value such as 6. For example, K and N may be set such that K=7 and N=100. When N is small, an initial sorting process is skipped, and thus a corresponding overhead is eliminated."

(Applicants' specification as amended 12/13/01, page 36, line 13 to page 37, line 2).

> "In the case where the total number N of members is small, K may be selected to be equal to N. However, when N is large, replacement of roles is performed only among K members, where K < N."

(Applicants' specification as amended 12/13/01, page 19, lines 18-22).

By having the ability to limit role replacement to a small subgroup of the members, the system is simplified, which reduces cost. As discussed in the "Background of the Invention" section of Applicants' specification, such simplification is acceptable in the technical field of animation, to which the present invention may be applied. In contrast, the cost of precisely simulating mechanical or physical motion, such as is described in Brogan et al., is high.

Applicants submit that the Examiner has not shown that Brogan et al. has the ability to limit role replacement to a small subgroup of the members. Instead, Brogan et al. appears to always alter the position of all members of the group. Namely, Brogan et al. states that the algorithm for group behaviors has a perception model to determine the creatures and obstacles visible to "each individual in the group" and a placement algorithm to determine the desired position for "each individual" given the locations and velocities of the

visible creatures and obstacles. (Brogan et al., page 140, col. 2, first full paragraph). Indeed, with respect to Brogan et al., the Examiner even states that "all of N members of the group have their position altered according to the aforementioned predicted error". (Office Action mailed 12/4/02, page 7, lines 12-13). Therefore, the Examiner has acknowledged that Brogan et al. alters the position of all members of the group.

Having the ability of "replacing the roles currently assigned to the respective selected members while not replacing the roles currently assigned to the respective non-selected members", as is recited in Applicants' amended independent claim 1, provides the ability to limit role replacement to a small subgroup of the members. Because the Examiner has shown that Brogan et al. alters the position of all members of the group, the rejection of Applicants' amended independent claim 1, as well as amended independent claims 7, 8, 9 and 11, should be withdrawn. Because claims 2, 3 and 5 depend from claim 1, the rejections of these claims should be withdrawn for at least the reasons provided for claim 1.

With respect to Applicants' independent claims 10 and 12, Applicants have amended step e) of each claim to recite replacing the assignments of the locations in the target layout within K! combinations of "only" the selected K members. Similar to as discussed above, amended claims 10 and 12 clarify that they provide the ability to limit role replacement to a small subgroup of the members. As such, Applicants submit that the rejections of amended claims 10 and 12 should also be withdrawn.

The Examiner also rejected claim 4 under 35 U.S.C. § 103(a) as being unpatentable over Brogan et al. in view of Blumberg and claim 6 as being unpatentable over Brogan et al.

in view of Microsoft. Because claims 4 and 6 depend from claim 1, the rejections of these claims should be withdrawn for at least the reasons provided above for claim 1.

No Fees Believed to be Due

Given that the total number of claims and number of independent claims has not changed, Applicants submit that no additional claims fees are due.

Version with Markings

A version with markings to show changes made begins on the following page.

C O N C L U S I O N

In view of the above, Applicant submits that the pending claims are in condition for allowance. Should there remain any outstanding issues that require adverse action, it is respectfully requested that the Examiner telephone Richard E. Wawrzyniak at (858)552-1311 so that such issues may be resolved as expeditiously as possible.

Respectfully submitted,

Dated 3/3/03

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VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the Claims:

Please AMEND claims 1, 2, 7, 8, 9, 10, 11 and 12 as follows:

1. (Amended) A method of producing an animation of a group including a plurality of members, said method comprising:

a continuous processing step for determining the states of the respective members at each time step in accordance with predetermined dynamic characteristics of the respective members; and

a discrete processing step for accepting, from the outside, a command specifying the overall state to be achieved for said group and assigning roles to the respective members of the group in accordance with the overall state specified by said command;

wherein if new roles are assigned to members in said discrete processing step, the dynamic states of the respective members are adjusted, in said continuous processing step, in accordance with the assigned new roles;

wherein said discrete processing step includes a role replacement step for selecting one or more of the members and for replacing the roles currently assigned to the respective selected members while not replacing the roles currently assigned to the respective non-selected members.

2. (Amended) A method of producing an animation of a group including a plurality of members, according to claim 1, [~~wherein said discrete processing step includes a role replacement step for replacing, among members, the roles~~

~~currently assigned to the respective members, and~~] wherein said role replacement step is performed when a predetermined triggering condition is satisfied or when it is determined that the overall performance index of the group can be reduced by the role replacement.

7. (Amended) An apparatus for producing an animation of a group including a plurality of members, said apparatus comprising:

a continuous processing means for determining the states of the respective members at each time step in accordance with predetermined dynamic characteristics of the respective members; and

a discrete processing means for accepting, from the outside, a command specifying the overall state to be achieved for said group and assigning roles to the respective members of the group in accordance with the overall state specified by said command;

wherein if new roles are assigned to members in said discrete processing means, the dynamic states of the respective members are adjusted, in said continuous processing means, in accordance with the assigned new roles;

wherein said discrete processing means includes a role replacement means for selecting one or more of the members and for replacing the roles currently assigned to the respective selected members while not replacing the roles currently assigned to the respective non-selected members.

8. (Amended) An entertainment apparatus for simulating a group including a plurality of interchangeable members, said apparatus comprising:

a continuous processing means for determining the states

of the respective members at each time step in accordance with predetermined dynamic characteristics of the respective members; and

a discrete processing means for accepting, from the outside, a command specifying the overall state to be achieved for said group and assigning roles to the respective members of the group in accordance with the overall state specified by said command;

wherein if new roles are assigned to members in said discrete processing means, the dynamic states of the respective members are adjusted, in said continuous processing means, in accordance with the assigned new roles;

wherein said discrete processing means includes a role replacement means for selecting one or more of the members and for replacing the roles currently assigned to the respective selected members while not replacing the roles currently assigned to the respective non-selected members.

9. (Amended) A method of controlling a system for simulating a group including a plurality of interchangeable members, said method comprising:

a continuous processing step for determining the states of the respective members at each time step in accordance with predetermined dynamic characteristics of the respective members; and

a discrete processing step for accepting, from the outside, a command specifying the overall state to be achieved for said group and assigning roles to the respective members of the group in accordance with the overall state specified by said command;

wherein if new roles are assigned to members in said discrete processing step, the dynamic states of the respective

members are adjusted, in said continuous processing step, in accordance with the assigned new roles;

wherein said discrete processing step includes a role replacement step for selecting one or more of the members and for replacing the roles currently assigned to the respective selected members while not replacing the roles currently assigned to the respective non-selected members.

10. (Amended) A method of, in a simulation of a group including N members where N is an integer equal to or greater than 2, controlling the movement of the members of the group so that the members are moved from locations in a predetermined initial layout in a state space to locations in a target layout, said method comprising the steps of:

a) assigning locations in said target layout to the respective members lying at locations in said initial layout so that the members are moved along the shortest distances to the locations in the target layout;

b) moving the members at the locations in said initial layout in accordance with the assignments made in step a);

c) calculating the value of a predetermined evaluation function associated with the movements, accomplished in said step b), of the respective members to the assigned locations in the target layout;

d) selecting K members, where K is an integer equal to or smaller than N, having the greatest values of the evaluation function; and

e) replacing the assignments of the locations in the target layout within K! combinations of only the selected K members,

wherein after completion of step e), the method returns to step b) so as to perform steps b) to e) repeatedly.

11. (Amended) A recording medium readable by an information processor, recording a program for enabling the information processor to produce an animation of a group including a plurality of members, wherein said program enables the information processor to execute:

a continuous processing step for determining the states of the respective members at each time step in accordance with predetermined dynamic characteristics of the respective members; and

a discrete processing step for accepting, from the outside, a command specifying the overall state to be achieved for said group and assigning roles to the respective members of the group in accordance with the overall state specified by said command;

wherein if new roles are assigned to members in said discrete processing step, the dynamic states of the respective members are adjusted, in said continuous processing step, in accordance with the assigned new roles;

wherein said discrete processing step includes a role replacement step for selecting one or more of the members and for replacing the roles currently assigned to the respective selected members while not replacing the roles currently assigned to the respective non-selected members.

12. (Amended) A recording medium readable by an information processor, recording a program for enabling an information processor, in a simulation of a group including N members where N is an integer equal to or greater than 2, to control the movement of the members of the group so that the members are moved from locations in a predetermined initial layout in a state space to locations in a target layout, wherein said program enables the information processor to

execute the steps of:

a) assigning locations in said target layout to the respective members lying at locations in said initial layout so that the members are moved along the shortest distances to the locations in the target layout;

b) moving the members at the locations in said initial layout in accordance with the assignments made in step a);

c) calculating the value of a predetermined evaluation function associated with the movements, accomplished in said step b), of the respective members to the assigned locations in the target layout;

d) selecting K members, where K is an integer equal to or smaller than N, having the greatest values of the evaluation function; and

e) replacing the assignments of the locations in the target layout within K! combinations of only the selected K members,

wherein after completion of step e), the method returns to step b) so as to perform steps b) to e) repeatedly.